

Listing of Claims

1. (Currently Amended) A control apparatus for relay node duplexing, comprising:

a duplexing control unit which maintains a message transmission function and disables a message receiving function of an active node and initiates a message receiving function of a standby node during a duplex exchange operation performed in response to a failure condition, and which transfers an active right signal to the standby node when the duplex exchange operation is completed, the control unit further maintaining a message transmission function of the standby node in a disabled state during the duplex exchange operation.

2. (Currently Amended) An [[The]] apparatus of claim 1 for relay node duplexing, comprising:

a duplexing control unit which maintains a message transmission function and disables a message receiving function of an active node and initiates a message receiving function of a standby node during a duplex exchange operation performed in response to a failure condition, and which transfers an active right signal to the standby node when the duplex exchange operation is completed, wherein the duplexing control unit comprises:

an active signal generation unit for generating the active right signal;

an exchange reporting unit for informing the standby node to prepare for a duplex exchange, when duplex exchange is requested, and controlling the active node not to receive a message any more;

an exchange complete detection unit for detecting a message storing state of a TX buffer and an RX buffer of the active node when preparation for the duplex exchange is reported, and controlling completion of the exchange according to a result of the detection;

an exchange determination unit for determining the completion of the exchange according to the control of the exchange completion of the exchange complete detection unit and outputting a result of the determination to the active signal generation unit;

an exchange preparation unit for preparing for the exchange by controlling the message receiving of the standby node when the exchange preparation is reported from the active node; and

an operation control unit for controlling the operation of the message receiving of the standby node according to the control of the exchange reporting unit and exchange preparation unit.

3. (Previously Presented) The apparatus of claim 1, wherein a buffer of the active node is emptied of messages when the message transmission function is maintained, and a buffer of the standby node receives a new message when the message receiving function is maintained.

4. (Previously Presented) The apparatus of claim 2, wherein the exchange reporting unit controls the operation control unit so that the message transmission function of the active node is disabled when the active signal generation unit generates the active right signal for transfer to the standby node.

5. (Previously Presented) The apparatus of claim 2, wherein the exchange reporting unit controls the operation control unit so that a message transmission function of the standby node is activated, when the active signal generation unit generates the active right signal for transfer to the standby node.

6. (Previously Presented) The apparatus of claim 2, wherein the operation control unit disables the message transmission function of the active node according to the control of the message transmission inactivation by the exchange reporting unit, and

enables the message receiving function of the standby node according to the control of the message receiving activation of the exchange preparation unit.

7. (Previously Presented) The apparatus of claim 1, wherein, if the duplex exchange operation is performed in response to a power fail signal, the active node is supplied with a stable voltage for a predetermined time by the power supply even after the occurrence of power down.

8. (Previously Presented) The apparatus of claim 7, wherein the predetermined time is longer than a time period between the power down and the generation of a duplex exchange complete signal.

9. (Previously Presented) The apparatus of claim 7, wherein the power supply supplies supply power to the active node for the predetermined time even after the power down as a result of a voltage charging function.

10. (Previously Presented) The apparatus of claim 1, wherein the message comprises a HDLC frame and an ethernet frame.

11. (Previously Presented) A control method for relay node duplexing, comprising:

generating an exchange start signal for at least one of an active node and a standby node when a duplex exchange operation is performed in response to a failure condition;

performing preparation for exchange between the active node and the standby node, respectively, when the exchange start signal is generated;

generating an exchange complete signal and setting the active node to an inactive state, when the preparation for exchange is completed at the active node; and

activating the standby node when the exchange complete signal is received by the standby node, wherein said preparation performing includes:

stopping a message receiving function and keeping a message transmission function at the active node;

transmitting a message already stored in a buffer of the active node before start of the duplex exchange;

activating a message receiving function at the standby node based on the exchange start signal, and

receiving a message for storage in a buffer of the standby node during the duplex exchange operation.

12. (Canceled)

13. (Previously Presented) A method for relay node duplexing, comprising:

- generating an exchange start signal for at least one of an active node and a standby node when a duplex exchange operation is performed in response to a failure condition;
- performing preparation for exchange between the active node and the standby node, respectively, when the exchange start signal is generated;
- generating an exchange complete signal and setting the active node to an inactive state, when the preparation for exchange is completed at the active node; and
- activating the standby node when the exchange complete signal is received by the standby node, wherein generating the exchange complete signal comprises:
 - detecting a state of a buffer at the active node; and
 - generating the exchange complete signal, if the buffer is determined to be empty as a result of the detected state.

14. (Previously Presented) The method of claim 11, wherein the standby node having received the exchange complete signal becomes active by activating a message transmission function for thereby completing the exchange.

15. (Previously Presented) The method of claim 11, wherein the message comprises a HDLC frame and an ethernet frame.

16. (Previously Presented) The method of claim 11, wherein the active node is supplied with a stable power for a predetermined time after power down, if the duplex exchange operation is performed in response to a power fail signal.

17. (Previously Presented) The method of claim 16, wherein the predetermined time is longer than a time period between the power down and generation of the exchange complete signal.

18. (Previously Presented) An apparatus, comprising:
a detection unit which detects a status signal indicative of a failure condition;
and

a control unit which maintains a message transmission function and disables a message receiving function of an active node and which activates a message receiving function and disables a message transmission function of a standby node during a duplex exchange operation initiated in response to the status signal.

19. (Previously Presented) The apparatus of claim 18, wherein the status signal indicates occurrence of a power failure of the active node.

20. (Previously Presented) The apparatus of claim 18, wherein at least one message buffer of the active node is emptied during a period when the message transmission function is maintained.

21. (Previously Presented) The apparatus of claim 20, wherein all messages stored in the buffer are transmitted to at least a second buffer.

22. (Previously Presented) The apparatus of claim 21, wherein the second buffer is located at the standby node.

23. (Previously Presented) An apparatus, comprising:

a detection unit which detects a status signal indicative of a failure condition;
and

a control unit which maintains a message transmission function and disables a message receiving function of an active node and which activates a message receiving function of a standby node during a duplex exchange operation initiated in response to the status signal, wherein the active node includes:

an interface coupled to a signal line; and

a message buffer coupled to the interface, wherein disabling the message receiving function includes disabling a message receiving capability of the interface, and wherein at least one message stored in the buffer is sent to the signal line through the interface while the message transmitting function is maintained.

24. (Previously Presented) The apparatus of claim 23, wherein all messages stored in the buffer are sent to the signal line through the interface while the message transmitting function is maintained.

25. (Previously Presented) The apparatus of claim 23, wherein the signal line is coupled to a message buffer in the standby node.

26. (Currently Amended) A control method, comprising:
- initiating a duplex exchange operation between active and standby nodes in response to detection of a failure condition;
 - disabling a message receiving function and maintaining a message transmitting function of an active node;
 - activating a message receiving function, and maintaining in a disabled state a message transmission function, of the standby mode during the duplex exchange operation;
 - emptying at least one message buffer of the active node; and
 - sending an active right signal to the standby node after the buffer is empty.
27. (Previously Presented) The method of claim 26, wherein the duplex exchange operation is initiated in response to a status signal of the active node.
28. (Previously Presented) The method of claim 27, wherein the status signal indicates occurrence of a power failure of the active node.

29. (Previously Presented) The method of claim 26, wherein emptying the at least one message buffer includes transmitting all messages stored in the buffer to at least a second buffer.

30. (Previously Presented) The method of claim 29, wherein the second buffer is located at the standby node.

31. (Currently Amended) The method of claim 26, further comprising:
~~activating a message receiving function of the standby node; and~~
transmitting at least one message stored in the message buffer to the standby node.

32-33 (Canceled)

34. (Currently Amended) An [[The]] apparatus of claim 33 for relay node duplexing, comprising:

a duplexing control unit which maintains a message transmission function and disables a message receiving function of an active node and initiates a message receiving function of a standby node during a duplex exchange operation performed in

response to a failure condition, and which transfers an active right signal to the standby node when the duplex exchange operation is completed, wherein the active node transmits one or more prepare signals to the standby node indicating the start of the duplex exchange operation, and wherein the message receiving function of the standby node is initiated and a [[the]] message transmission function of the standby node is maintained in a disabled state in response to said one or more prepare signals.

35. (Currently Amended) The apparatus of claim 34 ~~[[33]]~~, wherein the control unit is included with the active node and outputs said one or more prepare signals.

36. (Currently Amended) An ~~[[The]]~~ apparatus ~~of claim 1~~ for relay node duplexing, comprising:

a duplexing control unit which maintains a message transmission function and disables a message receiving function of an active node and initiates a message receiving function of a standby node during a duplex exchange operation performed in response to a failure condition, and which transfers an active right signal to the standby node when the duplex exchange operation is completed, wherein the active node includes a transmission buffer and a receive buffer, each of which outputs a status signal to the control unit indicating that a respective one of the buffers is empty.

37. (Previously Presented) The apparatus of claim 18, wherein the active node transmits one or more prepare signals to the standby node indicating the start of a duplex exchange operation.

38. (Previously Presented) The apparatus of claim 37, wherein the message receiving function of the standby node is activated and the message transmitting function of the standby node is disabled based on said one or more prepare signals.

39. (Previously Presented) The apparatus of claim 37, wherein the control unit is included with the active node and outputs said one or more prepare signals.

40. (Previously Presented) The apparatus of claim 18, wherein the active node includes a transmission buffer and a receive buffer, each of which outputs a status signal to the control unit indicating that a respective one of the buffers is empty.